

EA



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,397	03/29/2001	Brendan J. Kitts	VIGN1110	3292
44654	7590	08/25/2005	EXAMINER	
SPRINKLE IP LAW GROUP 1301 W. 25TH STREET SUITE 408 AUSTIN, TX 78705			JARRETT, SCOTT L	
			ART UNIT	PAPER NUMBER
			3623	

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/681,397

Applicant(s)

KITTS, BRENDAN J.

Examiner

Scott L. Jarrett

Art Unit

3623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/28/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This **Final** Office Action is responsive to Applicant's amendment filed May 27, 2005. Applicant's amendment amended claims 1-16. Currently claims 1-16 are pending.

Response to Amendment

2. Applicant's amendment filed on May 27, 2005 with respect to amended claims 1-16 necessitated new ground(s) of rejection.

Response to Arguments

3. Applicant's arguments with respect to amended claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

In applicant's remarks filed May 27, 2005 applicant argues that the prior art does not "appear to teach" training a model to obtain weights (parameters, coefficients, values, etc.) utilizing polynomial regression (Paragraphs 4-5, Page 5; Page 6, Paragraphs 2-3).

Examiner respectfully disagrees. Cabena et al. teach that the predictive modeling system and method trains and tests each of the plurality of well-known and widely used statistical/predictive models developed by the system wherein the goal of training and testing the model is to generate (select) a model that most accurately

Art Unit: 3623

reflects the data being modeled and therefore can be used to predict/forecast such future events as customer behavior (Pages 5, 9-10). Further Cabena et al. teach that part of the training and testing efforts include assigning a weight to each variable in a predictive model, specifically segmentation and neural networks (Paragraph 4, Page 12; "Field Weighting", Page 47; "adaptive connection", Page 145; "weight", Page 149).

Examiner agrees that Cabena et al. is silent on the specific utilization of polynomial regression to obtain model weights as now claimed.

However it is old and very well known that regression analysis (polynomial, multiple linear regression (MLR)) is a statistical analysis technique utilized to quantify the relationship between one or more dependent variables and one or more independent variables wherein the model typically takes the multi-variate form:

$$y = b_1x_1 + b_2x_2 + \dots b_nx_n \quad \text{or} \quad y = b_1x_1 + b_2x_2^2 + \dots b_nx_n^n$$

During regression analysis the constants and coefficients of the model (multi-variate equation) are determined (calculated, estimated, etc.) in order to "tune" (adjust, correlate) the model to "best fit" the data being modeled, this step being commonly referred to as the correlation of the model. The resulting, now correlated (trained, adjusted, weighted, etc.), model is then utilized to more accurately predict (forecast, model) such things as future customer behavior.

In other words the old and well known methods for performing regression analysis (polynomial, multiple linear, auto-regression, etc.) do not solely involve the

Art Unit: 3623

selection of the model variables but also the correlation of the model (i.e. variables) to the data (e.g. training and test data) through the utilization of weighted coefficients (correlation coefficients, values, relative importance, etc.) for each of the variables in the predictive model resulting in a predictive model that more closely matches the expected results (i.e. accuracy).

Evidence for the above-asserted facts can be found in at least the following:

- Keller, Martin, U.S. Patent No. 6,895,411 ("The most common prediction methodology in data mining is the multiple linear regression approach and the so-called multiple polynomial regression approach, the former representing a special case of the later.", Column 2, Lines 8-10; Column 1, Lines 42-68; Column 2, Lines 1-59);
 - Pednault et al., U.S. Patent Publication No. 2003/0176931 (Paragraphs 0007, 0014, 0017, 0025, 0058);
 - Pfaffenberger et al., Statistical Methods (1981; Pages 481-519 and 575-582);
- and
- Data Mining Techniques (StatSoft Inc., 1984-2003; Pages 1-3).

4. It is noted that the applicant did not challenge the Official Notice(s) cited in the First Office Action therefore those statements as presented are herein after prior art. Specifically it has been established that it was old and well known in the art at the time of the invention:

- to use splines for statistical analysis, predictive modeling, function approximation or model training.

Title

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Predicting Customer Behavior Utilizing Polynomial Regression Analysis.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabena et al., Intelligent Miner for Data Applications Guide (1999).

Regarding Claims 1 and 9 Cabena et al. teach a computer-implemented method of predicting a behavior of a plurality of customers at a plurality of future dates comprising (Section 1.4: Data Mining Applications, Pages 8-9; Section 1.5: Data Mining Techniques, Pages 9-13; Chapter 3: Case Study Framework, Pages 27-32; Chapters 4-7, Pages 33-132):

- accessing a plurality of data (information) regarding a plurality of customers from one or more databases ("databases", data warehouse, data sources; Paragraph 1, Page 15, Paragraph 1, Page 20; Page 21; Figure 3);

- generating time series (transactional, time based, over time, etc.) information for a plurality of customers;

- training a model to obtain weights (score, value, coefficients, parameters, etc.) for a variable wherein training is performed using at least some of the time series information (Section 6.3.3: Data Sampling for Training and Test, Pages 93-95; Section 6.3.5: Train and Test, Page 95; Pages 10,12, 24, 99, 101; Figures 60, 64);

- that part of the training and testing efforts include assigning a weight to each variable in a predictive model (e.g. segmentation and neural networks; Paragraph 4, Page 12; "Field Weighting", Page 47; "adaptive connection", Page 145; "weight", Page 149).

- predicting a behavior of a plurality of customers at a plurality of future dates, wherein predicting is performed using the weights in the model and at a frequency greater than monthly (Paragraph 1, Page 73); and

- forecasting results to a user in a graphical user interface ("Data Presentation", "Visualization", "Visualizer"; Bullet 2, Page 5; Section 2.3, Page 19; Page 21; Figures 2-3, 8 and 67).

While Cabena et al. teach that the predictive modeling system and method trains and tests (i.e. correlates) each of the plurality of well-known and widely used statistical/predictive models utilized/supported by the system for the purposes of selecting/generating a model that most accurately reflects the data being modeled (Pages 5, 9-10) Cabena et al. does not expressly teach utilizing polynomial regression to obtain (determine) model weights (parameters, coefficients, etc.) as claimed.

Official notice is taken that regression analysis (polynomial, multiple linear regression (MLR)) is an old and very well known statistical analysis technique utilized to quantify the relationship between one or more dependent variables and one or more independent variables wherein the model typically takes the multi-variate form:

$$y = b_1x_1 + b_2x_2 + \dots b_nx_n \quad \text{or} \quad y = b_1x_1 + b_2x_2^2 + \dots b_nx_n^n$$

During regression analysis the constants and coefficients of the model (multi-variate equation) are determined (calculated, estimated, etc.) in order to "tune" (adjust) the model to "best fit" the data being modeled, this step being commonly referred to as the correlation of the model. The resulting, now correlated (trained, adjusted, weighted, etc.), model is then utilized to more accurately predict (forecast, model) such things as future customer behavior.

It would have been obvious to one skilled in the art at the time of the invention that the predictive modeling system and method, with its utilization of well known and widely used statistical/predictive models, as taught by Cabena et al. would have utilized any of a plurality of well known statistical/predictive modeling techniques to correlate (train) the developed predictive models including polynomial regression (multiple linear regression) to obtain weights for each of the variables in the model in view of the teachings of official notice; the resultant system being able to more accurately predict future customer behavior utilizing a correlated (trained) model.

Regarding Claims 2 and 10 Cabena et al. teach that the predictive modeling system further comprises the ability to select a forecast horizon (Page 117) and a time window of transactions (of six months or less, Pages 72-73 and 91).

Regarding Claims 3 and 11 Cabena et al. teach that the predictive modeling system further comprises the ability to access data regarding a customer and generating time series information in substantially real-time (Continuous Interactive Marketing (CIM), continuous marketing; Pages 28-29).

Regarding Claims 4 and 12 Cabena et al. teach that the predictive modeling system includes modeling the likelihood of retention (Chapter 3.1: Customer Relationship Management, Pages 27-28; Chapter 7: Attrition Model to Improve Customer Retention, Pages 111-132; Figure 4).

Regarding Claims 5 and 13 Cabena et al. teach that the predictive modeling system includes modeling future revenue (sales, purchases, etc.; Pages 34, 36, 37, 39, 64; Table 1, Page 64).

Regarding Claims 6-7 and 14-15 Cabena et al. teach that the predictive modeling system includes accessing a plurality of information regarding a plurality of customers as well the preparing of data including but not limited to the treatment of outliers (Page 16; Section 4.3.2: Data Preparation, Pages 38-44; Section 6.3.2: Data Preparation, Page 92). More specifically Cabena et al. teach that the system iterates through the steps of data selection, data preparation, data mining, and results analysis (Figure 7, Page 14) thereby performing the data preparation portion of the process multiple times, before and after training has occurred.

Regarding Claims 8 and 16 Cabena et al. teach a system for predicting the future behavior of customers wherein a plurality of predictive modeling, data mining and statistical tools, techniques, algorithms, approximators (function approximators, estimators), and the like are utilized including but not limited to polynomial regression, neural networks and decision trees (Section 1.5: Data Mining Techniques, Pages 9-13; Page 24). Cabena et al. further teach that there is no single or best data mining technique (Paragraphs 5-6, Page 9).

Cabena et al. does not expressly teach the use of splines.

Official notice is taken that the use of splines for statistical analysis or predictive modeling or function approximation or model training is old and very well known in the art. Accordingly, it would have been obvious to one skilled in the art at the time of the invention that the predictive modeling system as taught by Cabena et al. would have benefited from including (utilizing) a plurality of data mining models, techniques, tools, etc. including but not limited to splines as a means enabling users to use the technique most applicable to their situation (use).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Simoudis et al., U.S. Patent No. 5,692,107, teach a data mining system and method that generates predictive models (clustering, case-based reasoning, inductive learning, statistical analysis, etc.) from one or more databases via a graphical user interface.

- Keller Martin, U.S. Patent No. 6,829,621, teaches a system for determining one or more dimensions (variables) of a data mining/online analytical processing database

wherein the system utilizes regression analysis (function) to select the best variables/dimensions for the multi-dimensional database.

- Keller, Martin, U.S. Patent No. 6,895,411, teaches a predictive modeling system and method that utilizes regression analysis (stepwise regression, polynomial regression, multiple linear regression) to correlate predictive models.

- Pednault et al., U.S. Patent Publication No. 2003/0176931, teach system and method for generating predictive models, specifically segmentation models. Pednault et al. further teach that predictive modeling is "an area of data mining and knowledge discovery that is specifically directed toward automatically extracting data patterns that have predictive value" and further that there exists a plurality of well known methods for automatically constructing predictive models.

- Neter et al., Applied Linear Statistical Models, teach a plurality of well known statistical analysis models, techniques and methods including but not limited to multiple linear regression.

- Pfaffenberger et al., Statistical Methods, teach a plurality of well known and widely used statistical models and methods including but not limited to multiple correlation and regression (i.e. multiple linear regression, auto-regression, etc.).

- Ng, K et al., Customer Retention via Data Mining (Abstract), teach the utilization of data mining techniques to solving/modeling the problem of customer retention.

- Zukerman et al., Predictive Statistical Models (Abstract), teach the utilization of statistical models to model (predict, forecast) customer behavior (user modeling).

Art Unit: 3623

- Data Mining Techniques (StatSoft Inc.), teaches the well-known utilization of data mining to predict (forecast, model) user behavior (i.e. predictive modeling) as well as the utilization of a plurality of weighting techniques (bagging, boosting, etc.).
- Garson, David, Multiple Regression, teaches the well-known and key concepts of multiple regression analysis.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott L. Jarrett whose telephone number is (571) 272-7033. The examiner can normally be reached on Monday-Friday, 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hafiz Tariq can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SJ
8/5/2005



Susanna Diaz
SUSANNA M. DIAZ
PRIMARY EXAMINER
AU 3623